ROBOTICS PROCESS AUTOMATION FOR CIRCULAR ECONOMICS SYSTEM

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ABSTRACT

The main objective of this research aims to do the circular economy by using robotics process automation (RPA) for the most efficient and comprehensive use of resources. RPA based on the large amounts of data that can contribute to increase the efficiency within company. To achieve this goal, in this research emphasized on the systems that could be used in accounting system to make invoice process more efficient. Uipath is one of the most popular RPA tools can be utilized to streamline the process. There are six processes in RPA implementation methodology for circular economics system 1. Planning: to identify which processes is the highest potential to automate and is coming forward with new business models 2. Analysis: to identify the exiting process that is manually and repetitive or rule-based 3. Design: to design the activities diagram and data structure 4. Development: to do the data conversion using Omnipage OCR engine and do the data type determination for classification using machine learning 5. Testing RPA implementation in UiPath and 6. Support and Maintenance. The results from this study demonstrated that the accuracy of RPA for invoice system using Uipath and Omnipage OCR is 85.51%. After data cleansing by data manipulation manually and using machine learning extractor, the result is 100% accurate before recording into the database. It can be concluded that Uipath has gained user acceptance and more opportunities are available in the market because using Uipath has drastically reduced the operational costs and increased productivity. On-going research, to develop the web application to do more analytics for the most efficient in circular economy.

Keywords: *RPA, circular economy, Uipath, Omnipage OCR, machine learning.*

1. INTRODUCTION

Most companies, the business information is still trapped in the documents. Concerning the business opportunity has one of the roles in driving economic progress. As the circular economy opens new avenues for businesses and alternatives for products and services. Therefore, many companies are realizing the potential of these opportunities and are coming forward with new business models. Investments in new infrastructure propelling the circular economy is essential to suit the requirements of the future market trends [1].

Robotic Process Automation (RPA) is a form of business process automation technology based on metaphorical software robots (bots) or artificial intelligence (AI)/digital workers [2]. The main goal of RPA is to transform information-intensive business processes, reduce manual work and errors, minimize costs, improve customer engagement and make better sense of abundant data. RPA can combine with cognitive capture, process orchestration, mobility and engagement, and analytics to ease implementations and deliver the results that mitigate compliance risk and increase competitiveness, growth and profitability [3].

RPA tools have technical similarities to graphical user interface testing tools. These tools also automate interactions with the GUI, and often do so by repeating a set of demonstration actions performed by a user. RPA tools differ from such systems that allow data to be handled in and between multiple applications, for instance, receiving email containing an invoice, extracting the data, and then typing that into a bookkeeping system [4]. Uipath is one of the most popular RPA tools can be utilized to streamline the process. Dealing with models and systems which perform functions generally associated with human intelligence, such as reasoning and learning. Uipath can complement people's skills and expand their capabilities. It allows humans to learn faster from feedback, deal more effectively with complexity [5].

This research aims to apply of robotics process automation (RPA) in circular economy for the most efficient and comprehensive use of resources in term of invoice processing process by using UiPath as a tool.

2. RPA IMPLEMENTATION METHODOLOGY
There are 6 processes in RPA implementation methodology for circular economics system as following:

2.1 Planning for circular economics system in UiPath
- To identify which processes is the highest potential to automate and is coming forward with new business models
- To set up the implementation timelines and approach
- To agree on solution design for performing RPA processes
- To identify the logging mechanism that should be implemented to find issues with running bots
- To clear the scale up RPA implementation

2.2 Analysis for circular economics system in UiPath
- To identify the exiting process that is manually and repetitive or rule-based
- To check the input data is in electronic format and is readable
- To apply in the existing system

2.3 Design for circular economics system in UiPath
- To design the activities diagram
- To design the data structure

2.4 Development for circular economics system in UiPath
- To do the data conversion using Omnipage OCR engine
- To do the data type determination for classification using machine learning extractor

2.5 Testing RPA implementation in UiPath
- To run testing cycles for automation to identify

2.6 Support and Maintenance RPA implementation in UiPath
- To provide continuous support after going live
- To helps in immediate defect resolution.
- To follow general maintenance guidelines with roles and
- To responsibilities with business and IT support teams.

3. RESULTS AND DISCUSSION

3.1 Planning for circular economics system in UiPath
The circular economics system requires a set of enabling conditions in ordered to be achieved. The data analyst involves the 'digital technology' strategy. The results in this study plan to apply for the invoice process is the highest potential to automate due to work in manually and time-consuming. The implementation timelines are within 3 months. Uipath is the open source software that is the best solution for performing RPA processes. Omnipage Optical Character Recognition (OCR) engine should be implemented to converse invoice data to OCR. There are 400 invoices documents from January to December 2018.

3.2 Analysis for circular economics system in UiPath
To analyze the common document types and classifications by considering the existing invoice process system that is manually and repetitive. To review the circular economics system, a means to transfer circular strategies and solutions from one company to another. The results in this study is to execute the repetitive process in invoice process system and check the input data is in electronic format and is readable. UiPath is easily simulate rekeying of data from invoice paper to OCR. It performs tasks like data entry, copying, and pasting. It is the paperless that save the environment.

3.3 Design for circular economics system in UiPath
Account for the systems perspective during the design. ln process, to design for appropriate lifetime and to design for extended future use. The design based on innovative and cost-effective processes. The results demonstrate the viability of its business model by using the activity diagram as shown in Figure 1.
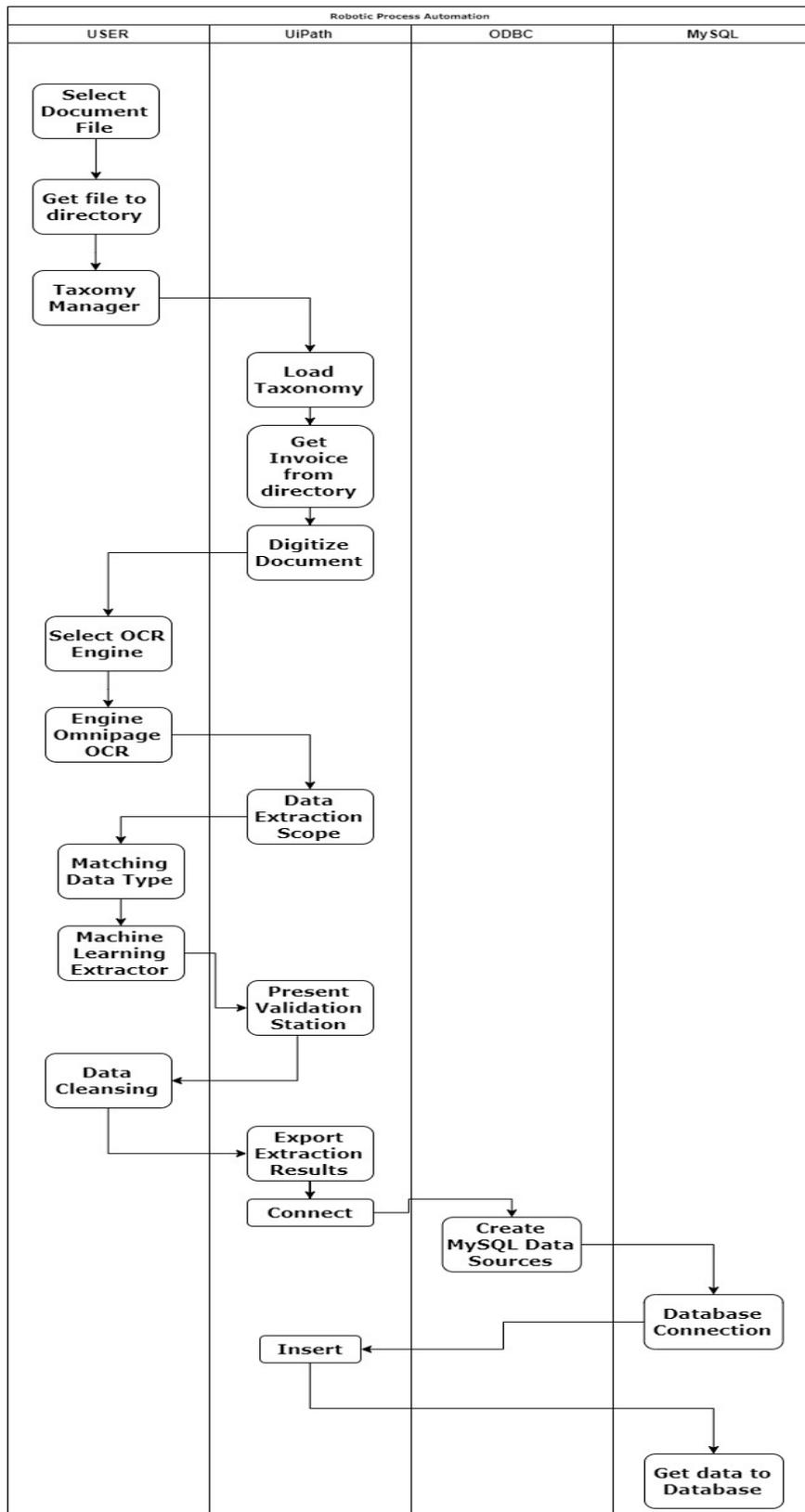
Figure 1: The activity diagram in UiPath for circular economics system

From Figure 1, there are 19 activities in UiPath to operate multiple and complex tasks across multiple systems that helps to process transactions, manipulate data, and save into database. The most important part is the quality of data then data cleansing before machine learning extractor. It is manually extract data from an image and present the output in a separate file.

The data structure in invoice for RPA processing is defined for taxonomy manager in UiPath as show in Table 1.

Table 1 The data structures of invoice described in the taxonomy manager

Fields Name	Taxonomy Type
Vendor_Name	Name
Vendor_Address	Address
order_receiver_name	Name
order_receiver_address	Address
order_date	Date
order_no	Text
PO_No	Text
order_total_tax	Number
Currency	Text
order_total_after_tax	Number
Item	Table

From table 1, there are 11 fields from invoice paper to provide as classifier and extractor activities to train that design for circular economics system in UiPath.

3.4 Development for circular economics system in UiPath

To apply UiPath for the large amounts of information means varying from simple data aggregation to complex data and allows for smart systems and technology integration in the circular economy. The result of the flowchart in UiPath as shown in Figure 2.
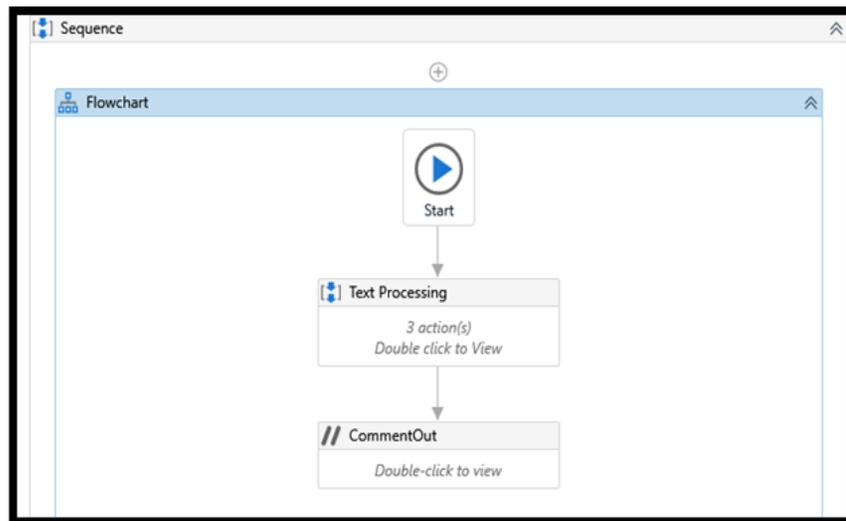
Figure 2: Flowchart in UiPath

From Figure 2, the flowchart in UiPath describes the first step to determine the text processing as RPA process as shown in Figure 3.
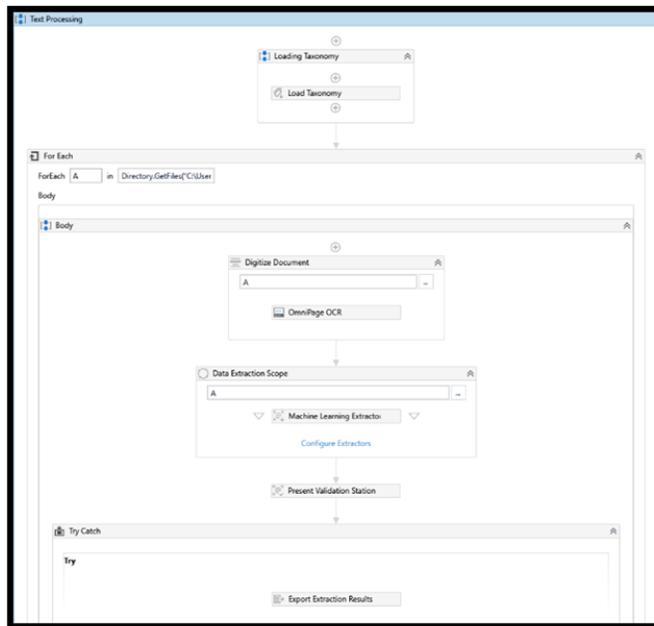
Figure 3: Text processing in UiPath

From Figure 3, the main process in text processing is the data conversion as digitized document from pdf to text using Omnipage optical character recognition (OCR) as a tool before machine learning as shown in Figure 4.

Figure 4: Digitized document using Omnipage optical character recognition (OCR)

From Figure 4, the accuracy of the robotics process automation for invoice system using Uipath and Omnipage OCR is 85.51%. The data can be used by classifier activities for classification using machine learning extractor as shown in Figure 5.

3.5 Testing

To validation in-scope automation to identify and correct defects as shown in Figure 6. As mention earlier the result is 100% accurate as shown in Figure 5.
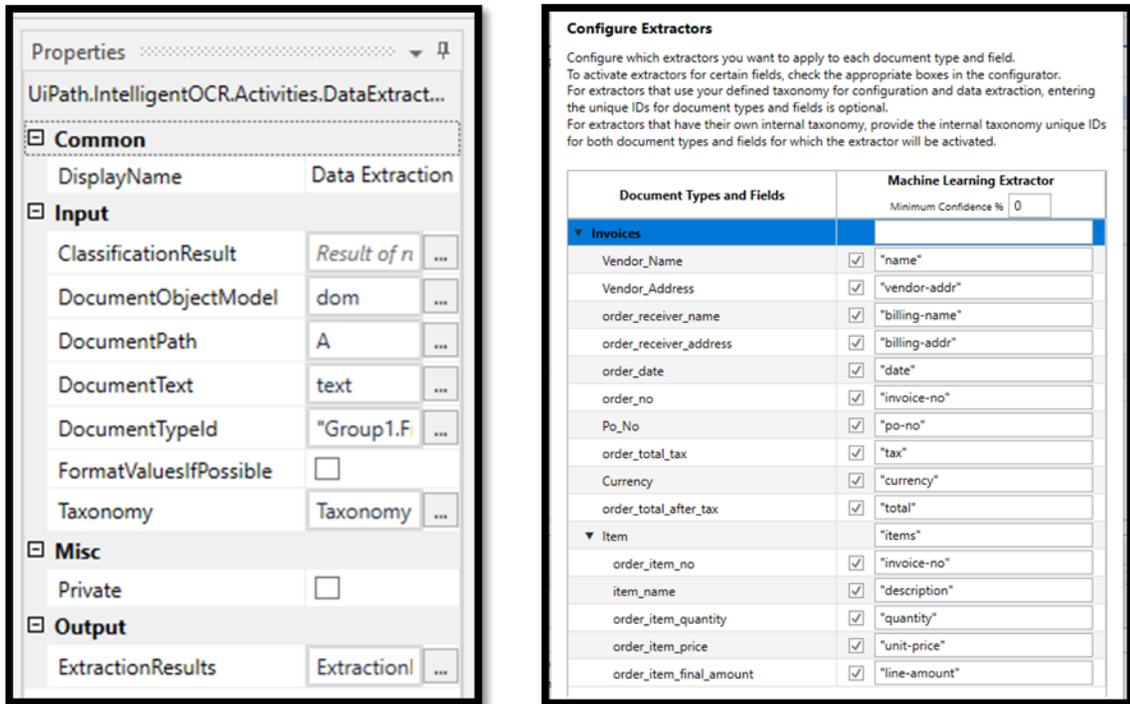

Figure 5: The data type determination for classification using machine learning extractor

From Figure 5, after data cleansing by data manipulation manually and using machine learning extractor provided by UiPath, the result is 100% accurate.
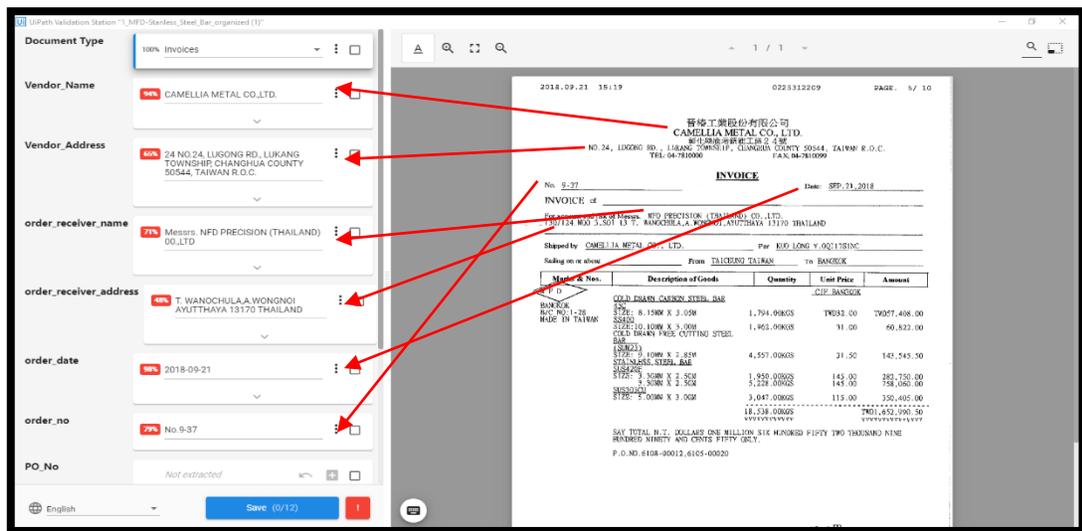

Figure 6: Data validation

From Figure 6, it can be concluded that Uipath has gained user acceptance and more opportunities are available in the market because using Uipath has drastically reduced the operational costs and increased productivity.

3.6 Support and Maintenance
UiPath provides the continuous support and general maintenance guidelines with roles and responsibilities with business and IT support teams.

4. CONCLUSION AND RECOMMENDATION
Operate circular business models, combining the power of RPA with a vision for a circular economy represents a significant, and not only magnify the competitive strength of circular economy business but also help increase asset utilization with accurate, effective and timely reports. The results from this study demonstrated that the accuracy of the robotics process automation (RPA) for invoice system using Uipath and Omnipage OCR is 85.51%. After data cleansing by data manipulation manually and using machine learning extractor, the result is 100 % accurate. It can be concluded that Uipath has gained user acceptance and more opportunities are available in the market because using Uipath has drastically reduced the operational costs and increased productivity. On-going research, to develop the web application to do more analytics for the most efficient in circular economy.

5.　REFERENCES
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